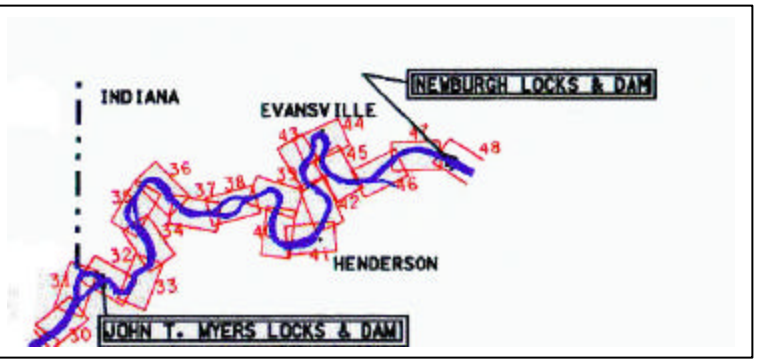
OHIO RIVER SHORELINE RESTORATION-MEYERS POOL (IN-05)

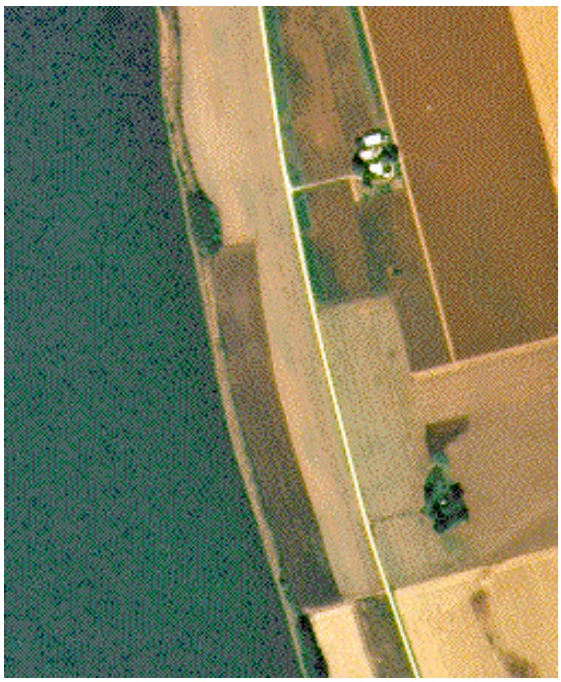
1.0 Location

The proposed Ohio River Shoreline Restoration project is located in Posey, Vanderburgh, and Warrick Counties, Indiana. The project area encompasses approximately 70 river miles in the Ohio River J. T. Meyer's Pool. The J. T. Meyers Pool extends from the Meyers Locks and Dam at Ohio River Mile (ORM) 846 to the Newburgh Locks and Dam at ORM 776.1. The project area is within the jurisdiction of the Louisville District, U.S. Army Corps of Engineers (USACE).



2.0 Project Goal, Description, and Rationale

The primary goal of the Ohio River Shoreline Restoration project in Meyer's Pool is the reforestation of 20 miles of shoreline with a 300-foot wide buffer of trees. The reforestation would enhance the area by providing seasonal habitat for fish, habitat and travel corridors for wildlife species, decreased shoreline erosion, and reduced flood impacts.

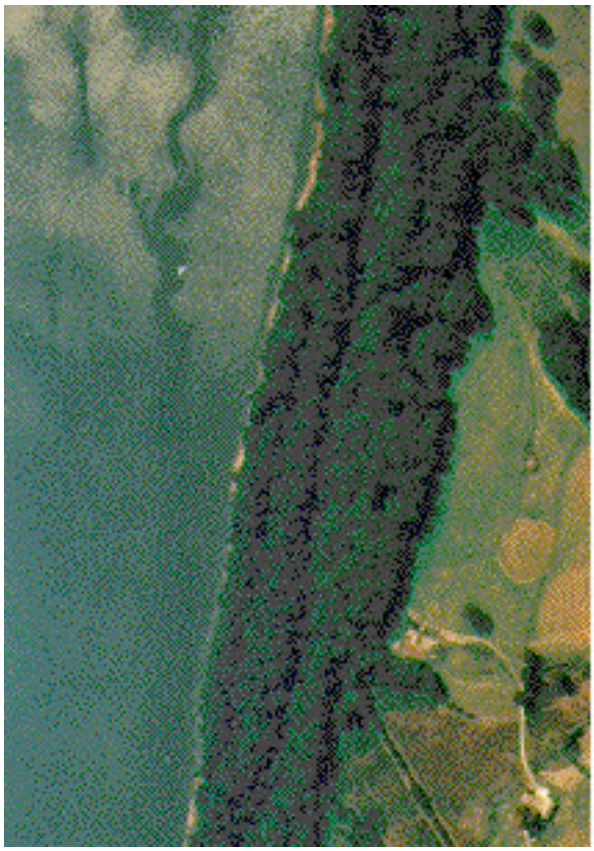


Shoreline near ORM 811

Shoreline near ORM 833

3.0 Existing Conditions

Terrestrial/Riparian Habitat: The Indiana shoreline along the Ohio River in the J. T. Meyers Pool contains a variety of habitat types. Agricultural lands, urban areas, undeveloped areas, and riparian forest areas are present along the Ohio River shoreline within the Meyers Pool.



Forested shoreline near ORM 780

Eroded shoreline near ORM 771

Forested shoreline near ORM 833

Aquatic Habitats: The Indiana shoreline and the littoral zone of the Ohio river comprise the southern boundary of the project area. The condition of the shoreline in the Meyers Pool varies from stable to severely eroded depending primarily on the amount of shoreline vegetation and the river currents. Typically, the forested portions of the shoreline are the least eroded and these areas provide good seasonal habitat for fishes. A variety of small to large tributary streams enter the Ohio River within the Meyers Pool.

Wetlands: The Meyers Pool shoreline is essentially a riparian site that may or may not be considered jurisdictional wetlands. A few scattered areas immediately adjacent to the Ohio River have hydrophytic vegetation such as seasonally flooded hardwoods.

Federally-Listed Threatened and Endangered Species: According to the U.S. Fish and Wildlife Service (USFWS), there are 11 federally-listed endangered species, one federally-listed threatened species, and one species listed as appearance similar to endangered species (E/SA) known to occur in Posey, Vanderburgh, and Warrick Counties, Indiana. These species are listed on Table 1.

Table 1. Federally-listed species known to occur in Posey, Vanderburgh, and Warrick Counties, Indiana.

Common Name	Scientific Name	Federal Status	Potential Habitat Present
Indiana bat	*Myotis sodalis*	Endangered	Yes
bald eagle	*Haliaeetus leucocephalis*	Threatened	Yes
peregrine falcon	*Falco peregrinus*	E/SA	No
eastern fanshell pearly mussel	*Cyprogenia stegaria*	Endangered	No
tubercled blossom mussel	*Epioblasma torulosa torulosa*	Endangered	No
pink mucket pearly mussel	*Lampsilis abrupta*	Endangered	No
ring pink mussel	*Obovaria retusa*	Endangered	No
white wartyback mussel	*Plethobasus cicatricosus*	Endangered	No
orange-foot pimpleback mussel	*Plethobasus cooperianus*	Endangered	No
Clubshell mussel	*Pleurobema clava*	Endangered	No
Rough pigtoe mussel	*Pleurobema plenum*	Endangered	No
Fat pocketbook mussel	*Potamilus capax*	Endangered	No
American burying beetle	*Nicrophorus americanus*	Endangered	No

Source: U.S. Fish and Wildlife Service, 1999

The riparian corridor adjacent to the Ohio River may provide summer roost habitat for the Indiana bat. Preferred tree species would include a mixture of oaks (*Quercus* spp.), silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), and shagbark hickory (*Carya ovata*) (INHS, 1996). The riparian corridor would also provide feeding/foraging habitat for the

Indiana bat. The areas selected for reforestation are expected to be areas with little or no existing forest, consequently little roost habitat currently exists in the areas to be reforested. Bald eagles and peregrine falcons may utilize forested areas for roosting/perching habitat and feed in the open water areas. The areas selected for reforestation are expected to be areas with little or no existing forest, consequently little roost habitat currently exists in the areas to be reforested.

All of the mussels are freshwater species that typically inhabit medium to large river systems. The mussels are typically found in habitats with substrates that range from silt to gravel, and in water depths from 0.5 to 8.0 meters. These species are generally associated with moderate to fast flowing water. The project site is a terrestrial site and therefore does not have suitable habitat for these species. It is possible that some of these species may exist within the Ohio River at locations adjacent to the project area.

The American burying beetle is generally associated with upland habitats such as grassland prairie, forest edge, and shrubland. It is unlikely that the beetle would be found in the Ohio River floodplain within the project area.

4.0 Project Diagram

Reforestation will be undertaken in a grid pattern at a density of 300 to 500 trees per acre within each area selected for this project as described in subsections 5.2 and 5.3. Examples of early stages of reforestation are shown in the following photographs.

Reforestation – Bald Cypress

Reforestation - Oaks

5.0 Engineering Design, Assumptions, and Requirements

5.1 Existing Ecological/Engineering Concern

A cooperative agreement with willing landowners would provide habitat improvements within the project area including the reestablishment of riparian habitat and subsequent shoreline stabilization, increased forest connectivity, and seasonal fish habitat during high water periods.

5.2 Reforestation

Approximately 727 acres (sections of shoreline totaling 20 miles in length and 300 feet wide) of Ohio River shoreline will be reforested with native mast producing bottomland hardwood trees. The reforestation will aid in the protection of the eroding Ohio River shoreline and reestablishment of riparian forest habitat within the project area. The reforestation will take place at multiple locations throughout the Meyers Pool.

Soil types, hydrology, and terrain position will be the primary factors considered when selecting the tree species to be planted, and a detailed planting design should be developed in order to insure that the planting effort is successful. Typical bottomland species to be planted in the floodplain area would include pin oak (*Quercus palustris*), swamp chestnut oak (*Quercus michauxii*), swamp white oak (*Quercus bicolor*), pecan (*Carya illinoensis*), and shagbark hickory (*Carya ovata*). Aggressive light mast producing species, such as silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), sycamore (*Platanus occidentalis*), and/or willows (*Salix* spp), would be expected to regenerate naturally.

Cottonwood and willow stakes would be planted as necessary along the Ohio River bank in order to facilitate natural bank stabilization.

5.3 Planning/Engineering Assumptions

- Nursery stock for reforestation will be obtained from a State of Indiana Nursery or other appropriate provider.
- Planting density will be 300 to 500 trees per acre.
- Bare root seedlings will be planted in a similar manner to ongoing reforestation efforts being conduction near the Hovey Lake Fish and Wildlife Area.
- Land acquisition will not be required. A long-term land management agreement or partnership between willing landowners and Indiana DNR is the preferred plan for this project.

6.0 Cost Estimate (Construction)

Reforestation - Engineering costs for the proposed project are contained on Table 2. A detailed MCACES cost estimate for the proposed project is included in Appendix C.

Table 2. Reforestation Costs.

Item	Cost
Development of agreements between landowners & IDNR	$ 20,000
Preparation of Forest Management Plan/Planting Design	$ 10,000
Mobilization	$ 10,000
Bottomland Hardwood Reforestation (727 acres)	$ 161,700
Cottonwood/Willow Bank Stabilization (73 acres)	$ 16,200
TOTAL	**$ 217,900**

7.0 Schedule

Shoreline Reforestation: The estimated construction time for this project is shown on Table 3.

Table 3. Construction Schedule.	
Item	**Time**
Development of Agreement between landowners and IDNR	1-5 years
Preparation of Forest Management Plan/Planting Design	1 year
Bottomland Hardwood Reforestation (727 acres)	1-8 years
Cottonwood/Willow Bank Stabilization (73 acres)	
TOTAL	**8 Years**

8.0 Expected Ecological Benefits

Terrestrial/Riparian Habitats: Riparian reforestation would stabilize the riverbank and reduce erosion potential. Terrestrial wildlife species would benefit from riparian corridor enhancement. Copperbelly watersnakes (a state-listed endangered species) occur in the riparian habitat that exists in the floodplain, and additional reforestation could potentially enhance habitat for this species. Reforestation will provide winter habitat for resident wildlife and will benefit a number of neotropical migrant bird species.

Aquatic Habitats: Reforestation of the riparian buffer along the shoreline would reduce bank erosion. The result of reduced bank erosion could potentially benefit freshwater fishes and invertebrates in the area due to decreased sediments entering the water column. During high water periods, inundated vegetation would provide nursery and feeding habitat for riverine fishes.

Wetlands: Seasonally flooded bottomland hardwood wetlands and riparian zones will be restored. This would benefit wetland oriented species as well as neotropical migrants and waterfowl.

Federally-Listed Threatened and Endangered Species: Reforestation of the project site could potentially benefit the Indiana bat, bald eagle, and peregrine falcon. Successful reforestation would provide potential summer roosting habitat for the Indiana bat, and potential roosting/perching habitat for the bald eagle and peregrine falcon. Potential long-term water quality benefits would be anticipated for federally-listed endangered mussel species. No forseeable impacts to the American burying beetle are expected as a result of implementing the proposed project.

Socioeconomic Resources: There would be no reasonably foreseeable beneficial impacts to socioeconomic resources as a result of implementing the proposed project.

9.0 Potential Adverse Environmental Impacts

Terrestrial/Riparian Habitats: There would be no reasonably foreseeable adverse impacts to terrestrial or riparian resources as a result of implementing the proposed project.

Aquatic Habitats: There would be no reasonably foreseeable adverse impacts to aquatic resources as a result of implementing the proposed project.

Wetlands: There would be no reasonably foreseeable adverse impacts to jurisdictional wetlands as a result of implementing the proposed project.

Federally-Listed Threatened and Endangered Species: There would be no foreseeable adverse impacts to federally-listed threatened or endangered species as a result of implementing the proposed project.

Socioeconomic Resources: There would be long-term adverse impacts to socioeconomic resources as a result of implementing the Meyers Pool Shoreline Restoration Project. The long-term impacts will be associated with the conversion of floodplain agricultural lands into bottomland forest.

10.0 Mitigation

The conversion of agricultural and/or undeveloped land to forested land would not require mitigation. The use of best management practices during the reforestation planting activities would minimize any potential impacts associated with the planting of trees in the project area.

11.0 Preliminary Operation and Maintenance Costs:

The operation and maintenance costs associated with the Meyers Pool Shoreline Habitat Restoration project would be correlated to the amount of active management on the area. Labor associated with wildlife management of the project area would be the primary cost associated with the long-term maintenance of the area. Minor secondary plantings/replanting may also be required depending upon the success of the original reforestation.

12.0 Potential Cost Share Sponsor(s)

- Indiana Department of Natural Resources
- The Nature Conservancy
- Ducks Unlimited
- Local Government
- County Government
- Local Economic Development Council
- Indiana Bass Federation
- Local BASS chapters
- Private corporations
- Local marinas

13.0 Expected Life of the Project

It is anticipated that the Meyers Pool Shoreline Restoration project area will be managed for natural resources by the Indiana DNR and willing landowners in perpetuity.

14.0 Hazardous, Toxic, and Radiological Waste Considerations

Potential impacts of hazardous, toxic, and radiological waste (HTRW) at the site were visually assessed during a site visit.

Site Inspection Findings.

The project involves 70 miles of Indiana shoreline along the Ohio River from ORM 846 to 776.1. Indiana towns or cities located along the shoreline are Hovey at ORM 833, Mount Vernon at ORM 830, West Franklin at ORM 817, Cypress at ORM 798, Evansville between ORM 795 and 791, and Newburgh at ORM 778.

The entire Indiana shoreline in the Meyers Pool was not visually inspected. However, the following environmental conditions were considered when conducting the June 29, 1999 project area inspection:

- Suspicious/Unusual Odors;
- Discolored Soil;
- Distressed Vegetation;
- Dirt/Debris Mounds;
- Ground Depressions;
- Oil Staining;
- Above Ground Storage Tanks (ASTs);
- Underground Storage Tanks (USTs);
- Landfills/Wastepiles;
- Impoundments/Lagoons;
- Drum/Container Storage;
- Electrical Transformers;
- Standpipes/Vent pipes;
- Surface Water Discharges;
- Power or Pipelines;
- Mining/Logging; and
- Other.

None of the environmental conditions listed above were observed on the portions of the project area that were inspected. A more comprehensive site inspection including an HTRW database search should be conducted at specific restoration sites if land acquisition is considered.

15.0 Property Ownership & River Access

The proposed project area covers a large geographical area. Specific properties for reforestation of the Ohio River Shoreline Restoration project have not been identified. Decisions on site selection would need to be made before further work could be accomplished. Land acquisitions or easements/agreements with current property owners would need to be investigated.

Based on estimates of cost/acre for other sites in Posey and Warrick Counties, Indiana, cost estimates for land acquisition or easement purchase on this site could range between $100.00/acre and $1000.00/acre. Local real estate brokers could provide a more accurate estimate of actual land values. It is anticipated that easements/management agreements would be less costly than acquisition.

16.0 References

INHS, 1996	Illinois Natural History Survey Reports, March-April 1996. Survey Document #2152. Center for Biodiversity (J. Hofmann).
USFWS, 1983	U.S. Fish and Wildlife Service, 1983. Northern States Bald Eagle Recovery Plan. USFWS Denver, Colorado
USFWS, 1983	U.S. Fish and Wildlife Service, 1983. Recovery Plan for the Indiana bat (*Myotis sodalis*).
USFWS, 1984	U.S. Fish and Wildlife Service, 1984. Recovery Plan for the Orange-footed Pearly Mussel, Plethobasus cooperianus. Prepared by S. Ahlstedt for USFWS Region 4 August 30, 1984. 46pp.
USFWS, 1985	U.S. Fish and Wildlife Service, 1985. Recovery Plan for the Tuberculed-blossom Pearly Mussel, *Epioblasma torulosa torulosa*, Turgid-blossom Pearly Mussel, *Epioblasma turgidula*, Yellow-blossom Pearly Mussel, *Epioblama florentina florentina*. USFWS Atlanta, Georgia. 42pp.
USFWS, 1985	U.S. Fish and Wildlife Service, 1996. Recovery plan for the pink mucket pearly mussel. USFWS Atlanta, Georgia.
USFWS, 1991	U.S. Fish and Wildlife Service, 1991. Recovery Plan for Ring Pink Mussel (*Obovaria retusa*). Prepared by R.G. Biggins for the Southeast Region USFWS February, 1991. 24pp.
USFWS, 1991	U.S. Fish and Wildlife Service, 1991. Fanshell Recovery Plan. Prepared by R.G. Biggins for the Southeast Region USFWS July 9, 1991. 37pp.
USFWS, 1994	Recovery Plan for the Clubshell (*Pleurobema clava*), Northern Riffleshell (*Epioblasma torulosa rangiana*). Prepared by G.T. Watters for USFWS Region 5, Hadley, Massachusetts. 57pp.
USFWS, 1997	U.S. Fish and Wildlife Service, 1997. Species Accounts: pink mucket pearly mussel (*Lampsilis abrupta*).
USFWS, 1999	U.S. Fish and Wildlife Service, July 1, 1999. Federally Listed Endangered and Threatened Species in Indiana.

APPENDIX A Threatened & Endangered Species

APPENDIX B Plan Formulation and Incremental Analysis Checklist

Project Site Location:

The proposed Ohio River Shoreline Restoration project is located in Posey, Vanderburgh, and Warrick Counties, Indiana. The project area encompasses approximately 70 river miles in the Ohio River J. T. Meyer's Pool. Twenty (20 miles of the Indiana shoreline within the Meyers Pool will be reforested. The J. T. Meyers Pool extends from the Meyers Locks and Dam at ORM 846 to the Newburgh Locks and Dam at ORM 776.1. The project area is within the jurisdiction of the Louisville District, U.S. Army Corps of Engineers (USACE).

Description of Plan Selected:

Notable portions of the Ohio River shoreline within the Meyers Pool lacks shoreline vegetation and exhibits bank erosion. The project involves the possibility of forming partnerships with willing landowners to restore shoreline forests along the Ohio River. The primary goal of the project would be reforestation of the riparian zone along the river. Floodplain reforestation and protection of tributary riparian zones would also be considered.

Alternatives of the Selected Plan:

Smaller Size Plans Possible**?** **Yes** **Reduce the extent of reforestation.**

Larger Size Plan Possible**?** **Yes** **Increase the extent of reforestation.**

Other alternatives? **No**

Restore/Enhance/Protect Terrestrial Habitats? Yes **Objective numbers met** T1 & T3

Restore, Enhance, & Protect Wetlands? No **Objective numbers met**

Restore/Enhance/Protect Aquatic Habitats? No **Objective numbers met**

Type species benefited: Variety of terrestrial and floodplain plants and animals.

Endangered species benefited: Possibly bald eagle, peregrine falcon, and Indiana bat.

Can estimated amount of habitat units be determined: Approximately 727 acres of shoreline riparian habitat will be restored.

Plan acceptable to Resources Agencies?

U.S. Fish & Wildlife Service?

State Department of Natural Resources? Yes Indiana DNR

Plan considered complete? **Connected to other plans for restoration?**

Real Estate owned by State Agency? No **Federal Agency?** No

Real Estate privately owned? Yes

If privately owned, what is status of future acquisition Agreements with willing landowners will be required for this project.

Does this plan contribute significantly to the ecosystem structure or function requiring restoration? What goal or values does it meet in the Ecosystem Restoration Plan?

The reforestation will aid in the protection of the eroding Ohio River shoreline, flood desynchronization, and reestablishment of riparian forest habitat within the project area.

Is this restoration plan a part of restoration projects planned by other agencies? (i.e. North American Waterfowl Management Plan, etc.)

No

In agencies opinion is the plan the most cost effective plan that can be implemented at this location?

Can this plan be implemented more cost effectively by another agency or institution?
Yes / No
Who:

From an incremental cost basis are there any features in this plan that would make the project more expensive than a typical project of the same nature? For embayment type plans is there excessive haul distance to disposal site? More expensive type disposal? Spoil that requires special handling/disposal?

Potential Project Sponsor:

Government Entity:_____
Non-government Entity _____

Corps Contractor _____Date_____

U.S. Fish & Wildlife Representative _____Date_____

State Agency Representative _____Date _____

U.S. Army Corps of Engineers Representative _____Date _____

Terrestrial Habitat Objectives

T1 Riparian Corridors

T2 Islands

T3 Floodplains

T4 Other unique habitats (canebrakes, river bluffs, etc.)

Wetland Habitat Objectives

W1 Forested Wetlands: Bottomland Hardwoods

W2 Forested Wetlands: Cypress/Tupelo Swamps and other unique forested wetlands

W3 Scrub/Shrub Emergent Wetlands: isolated from the river except during high water and contiguous (includes scrub/shrub wetlands in embayments and island sloughs)

Aquatic Habitat Objectives

A1 Backwaters (sloughs, embayments, oxbows, bayous, etc.)

A2 Riverine submerged and aquatic vegetation

A3 Sand and gravel bars

A4 Riffles/Runs (tailwaters)

A5 Pools (deep water, slow velocity, soft substrate)

A6 Side Channel/Back Channel Habitat

A7 Fish Passage

A8 Riparian Enhancement/Protection

APPENDIX C Micro Computer-Aided Cost Engineering System (MCACES)